



Strategic Warheads with Modern Safety Features

In March 1986, the first production unit of the W87 warhead for the Peacekeeper intercontinental ballistic missile (ICBM) was completed at the Pantex plant in Amarillo, Texas. This event culminated a four-year advanced development program executed by the Laboratory in close coordination with Sandia National Laboratories, the Air Force and its contractors, particularly AVCO, which was responsible for the Mk21 reentry vehicle. Peacekeeper carries 10 independently targetable Mk21 reentry vehicles with W87 warheads.

The W87 design is unique for strategic ballistic missile systems in its use of an insensitive high explosive (see Year 1976) and a fire-resistant pit design; both features help to minimize the possibility of plutonium dispersal in the event of an accident. First incorporated in Livermore's W84 warhead design for the ground-launched cruise missile, a fire-resistant pit includes in the weapon primary a metal shell that is able to keep molten plutonium contained. Both the W84 and W87 also include detonator strong links that provide additional safety assurance.

The enhanced safety design features of the W87 were incorporated at an early stage of the development program when Air Force plans called for Peacekeeper, at that time known as MX, to be based in the Multiple Protective Shelter mode. To improve missile survivability in an attack, a large number of moderately hardened shelters would be built, and the ICBMs would be clandestinely shuttled among them, forcing an attacker to target all shelters or to guess which held a missile. Although this plan was later abandoned in favor of basing the missile in Minuteman silos, the enhanced safety features were included in the W87 because they were accommodated within the weight allowance and they provided additional insurance against plutonium dispersal if an accident occurs during operations.

Engineering tests supported the development of the W87 warhead for the Peacekeeper missile, which carries 10 Mk21 reentry vehicles with W87s. Through an ongoing Stockpile Life Extension Program, W87 warheads are being refurbished to extend their long-term use on Minuteman III ICBMs.

The U.S. has decided to retire Peacekeeper ICBMs and to deploy a large fraction of its W87 warheads on Minuteman III missiles. To prepare for long-term continuing deployment of the W87, a Life Extension Program for the W87 was initiated in 1995 to make some mechanical modifications. The first refurbished warhead under this program was produced in 1999, with all units to be completed in 2004. Extensive ground and flight testing together with detailed calculations using the newly available Blue Pacific supercomputer preceded formal certification of the refurbished W87s in April 2001. Certification without nuclear testing was an important early demonstration of new capabilities developed under the Stockpile Stewardship Program.

Studies of MX Basing

In 1982, President Reagan set up a commission led by Professor Charles M. Townes (University of California at Berkeley) to evaluate basing options for the MX missile. The commission sought input from a variety of sources, including weapon systems analysts from Livermore's D Division.

Upon conclusion of the study, Townes wrote to University President David Saxon: "It was clear that most of the industrial organizations were quite cautious about giving information or making conclusions which would be contrary to Pentagon policy. I was personally impressed that the many persons who helped us from Livermore seemed completely objective in examining the technical facts, in investigating what needed to be looked into, and in being willing to state plainly, though diplomatically, where they did not agree. . . . I make the above point because I think, contrary to some opinions, Laboratory personnel are often important in giving helpful perspective and ameliorating U.S. nuclear policy, and that this is partly because they are protected by the management structure from the obvious pressures to which commercial or governmental laboratories are subjected."